Technology Opportunity

Fiber Push-Out Testing Systems

The National Aeronautics and Space Administration (NASA) seeks to transfer the NASA-developed instrumentation for fiber push-out testing. With this instrumentation, the bonding strength of fiber reinforcements in fiber-reinforced composite materials can be determined.

Potential Commercial Uses

- Quality control tool for composite material manufacturers
- Development tool for producing new composite materials
- Product to be marketed to industries using composite materials
  - Aeronautics (engine and airframe components)
  - Automotive (engine blocks)
  - Energy utilities (turbine components)
  - High-performance athletic equipment

Benefits

- Provides low-cost, routine testing of bonding of fiber reinforcements
- Allows testing at intended-use temperatures and in controlled environments
- Provides screening test for fiber coating selection
- Introduces new industry product

The Technology

Fiber push-out testing systems have been developed at NASA Lewis to evaluate the bonding and the sliding resistance of fibers within fiber-reinforced composite materials. The test measurements aid in selecting appropriate fiber treatments for composite materials being developed for lighter, cleaner-burning jet engines.

The fiber push-out systems use a micro-punch to dislodge a reinforcing fiber within a thin slice of fiber-reinforced composite material. The force required to dislodge the fiber as well as the force required to continue moving the fiber against frictional resistance are recorded.

NASA Lewis has developed two versions of the fiber push-out system: a desktop, room-temperature version and a high-temperature version. Both versions feature magnified video monitoring and computer data acquisition and control. The desktop, room-temperature system is very compact, low cost, and user-friendly (see fig. 1). The high-temperature system adds the capabilities of testing at up to 2000 °F in a controlled environment.

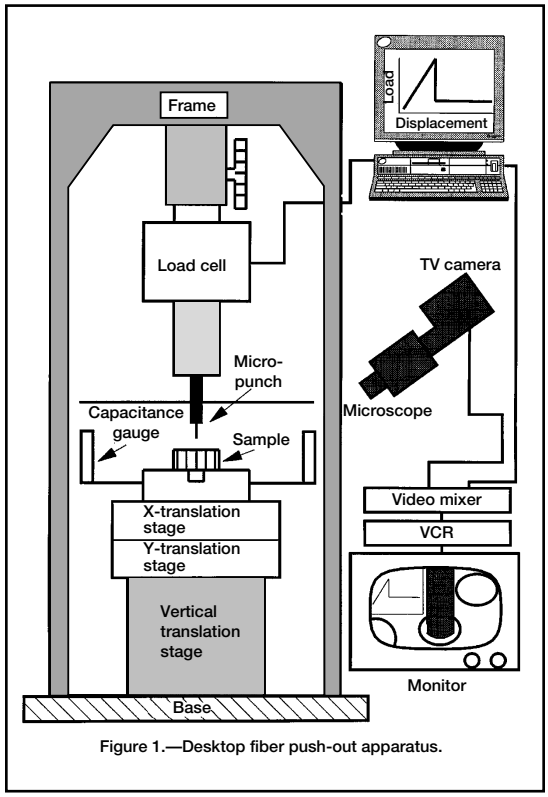

Figure 1.—Desktop fiber push-out apparatus.

Options for Commercialization

The NASA Lewis Research Center believes the fiber push-out systems described herein can be manufactured and profitably marketed to composite material manufacturers and research laboratories as a quality control and development tool. NASA has been granted a patent for the high-temperature fiber

push-out system and licensing arrangements are available. No application has been made to patent the desktop fiber push-out system; partnerships with industry are welcome.

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